

Fault Detection and Isolation of Satellite Formations using a Ground Station, Phase I

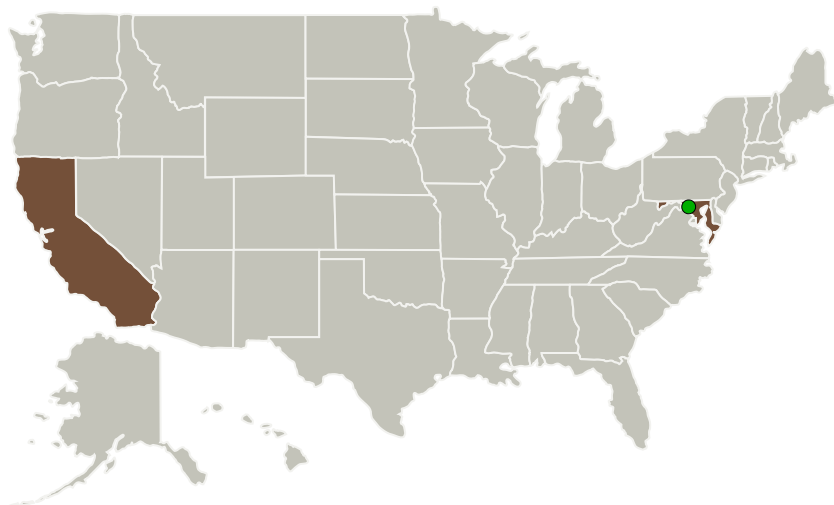
Completed Technology Project (2011 - 2011)



Project Introduction

This proposal is for the development a fault detection and isolation (FDI) algorithm for a formation of satellites but processed at a ground station. The algorithm will be capable of operating when measurement data is available on an intermittent basis. An FDI algorithm for faults in the three translational and rotational modes of 4 satellites flying in formation in a highly elliptical orbit will be designed during the Phase 1 effort. The satellites will carry a limited suite of instruments, just sufficient to determine faults in the three translational and rotational modes and include a GPS receiver. Communication with a ground station will only be available near perigee. The measurement data is not stored and transmitted in bursts, so these communication blackouts represent a break in the time history of measurements. The proposed development will mitigate these breaks so that fault detection and isolation can be performed faster than in a simple, cyclical restart implementation. Furthermore, their elliptical orbit will carry the satellites beyond the GPS constellation. The proposed development will account for the loss of GPS coverage as well investigate ways of extending the useful of GPS (when signals are weak) for fault detection and isolation.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
SySense, Inc.	Lead Organization	Industry	El Segundo, California
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
California	Maryland

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138155>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

SySense, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

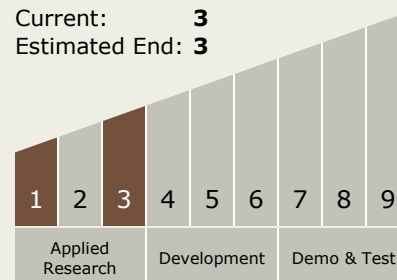
Carlos Torrez

Principal Investigator:

Sung M Kang

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
 - └ TX17.4 Attitude Estimation Technologies
 - └ TX17.4.3 Attitude Estimation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System